

## Engage with China's Belt and Road science boost

**China is deepening research ties with low- and middle-income countries. Western nations would be wise to join these efforts.**

**T**here are two ways of looking at China's US\$1-trillion Belt and Road initiative (BRI), which was the subject of a tenth-anniversary summit in Beijing last week. In monetary terms, the project to build and develop infrastructure in low- and middle-income countries is winding down – \$4 billion in loans were paid out in 2021, down from a high of more than \$85 billion in 2016 (see [go.nature.com/497z0bo](https://go.nature.com/497z0bo)). But when it comes to scientific cooperation, the trend is in the opposite direction.

In 2018 and 2019, *Nature* sent teams of reporters to countries involved in the BRI to explore the project's science aspects. We spoke to more than 100 people, including researchers and policymakers, to get a measure of China's ambition to hugely expand its international research collaboration, redrawing the global science map. These collaborations were being forged in addition to, not instead of, China's research links with Europe and the United States.

Those ambitions remain undimmed. The Chinese premier, Xi Jinping, confirmed at the summit that the number of laboratories built across countries participating in the BRI will rise to 100 in the next five years. And a host of international networking conferences are scheduled for the remainder of 2023 and 2024 that will bring together researchers in fields as diverse as agriculture, intellectual property and nuclear technology.

The difference now is that this is happening as researchers in China and in the United States and Western Europe gradually pull back from one another. National concerns over matters such as espionage, free trade and military threats have spilt over into restrictions on research.

As geopolitical tensions continue to rise, the world is once again aligning with two poles of power. In these columns we repeatedly make the case for global research collaboration – not least because, without it, there can be no lasting solutions to the interconnected economic, environmental and political crises we face. These are encapsulated in the 17 United Nations Sustainable Development Goals. Countries are connected to each other as never before. Researchers need to do all they can to keep lines of communication open.

In the space of a decade, China has built or upgraded ports in Greece and Sri Lanka and introduced high-speed rail to Kenya and Indonesia. Researchers and students at Tongji University in Shanghai, China, designed the headquarters

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of the African Union secretariat in Addis Ababa. China is also co-funding construction of the nearby headquarters of the Africa Centers for Disease Control and Prevention.

Such assistance is undoubtedly filling unmet needs, but the BRI's implementation has not been without drawbacks. Most of the financing China has provided is in loans, which many countries are now struggling to repay in the face of the cost-of-living crisis that has followed the COVID-19 pandemic and Russia's invasion of Ukraine. And investments facilitated by the BRI have not been particularly green.

Much of the infrastructure is in ecologically sensitive areas or was built with weak environmental standards. Some projects have involved little or no consultation with affected communities, according to a report published last year by a team at the University of Cambridge, UK (see [go.nature.com/3fsei8v](https://go.nature.com/3fsei8v)). And although China says it stopped funding the construction of coal-fired power plants abroad in 2022, emissions from fossil-fuel-powered plants that it has already built add the equivalent of 245 million tonnes of carbon dioxide to the atmosphere every year.

But in science, the BRI is coming into its own. In 2019, *Nature* travelled to a large construction site where a new university was being built. The Pak-Austria Fachhochschule, a collaboration between Austria, China and Pakistan, opened in 2020. Its first students will graduate next year, and it has already opened collaborative research centres in artificial intelligence, critical minerals and railway engineering. In Beijing, *Nature* talked to some of the 200 international doctoral students selected annually and funded by the Chinese Academy of Sciences (CAS) and the UNESCO World Academy of Sciences, based in Trieste, Italy. The scheme now supports 300 new PhD scholars a year.

Last month, in a collaboration between CAS, the National Museums of Kenya and the Sino-Africa Joint Research Center near Nairobi, researchers published the first in a 31-volume study called *Flora of Kenya*, which will catalogue nearly 7,000 plant species. And this month saw the announcement that the space agencies of Pakistan and Azerbaijan will join other international partners in China's lunar research-station project, which aims to build a permanent base on the Moon in the 2030s.

The Alliance of International Science Organizations is a network of science institutions that advises on science policy for the BRI. Based at CAS, it has global representation. It organizes PhD scholarships in China, as well as funding calls for projects between its 67 institutional members, spread across 48 countries – up from 37 members in 2019. The UN's science and education agency UNESCO is involved, as are a small number of European science academies. More academies from Western Europe should consider joining. US academies should also look at participating; currently none are signed up.

Last month, the European Union, the United States, India, Saudi Arabia and the United Arab Emirates announced plans for their own BRI-style infrastructure project connecting Europe, the Middle East and India. This might also include research cooperation. The scheme will provide opportunities for participating countries, and is to be welcomed. But the BRI is not going away and the West should

engage with its research programmes.

China wants to share its experiences of how to escape poverty, having made great strides towards that goal in a generation. But to tackle global economic, environmental and political issues, policymaking and governance need to be research-based and multilateral. China and its Western partners must take a more sophisticated approach to how they deal with one another amid rising geopolitical tensions. Stopping person-to-person contact and ending longstanding institutional research relationships is not the way to address climate change, prevent wars, or avoid or tackle another global financial crisis.

## Postdocs are organizing – and that is a good thing

**The issues of low pay, job insecurity and a lack of career progression are well known. Now, postdocs are demanding change.**

“People have been talking about this for nearly my entire life,” says a respondent to *Nature’s* latest survey of postdoctoral researchers. These words highlight how, compared with people who have similar qualifications but work in other sectors, low salaries and insecure working conditions are part and parcel of the postdoc experience.

But *Nature’s* second global survey of the postdoctoral work force, explored in a series of Careers Features over the past three weeks, reveals signs that repeatedly highlighting problems is leading to action.

Of the 3,838 self-selecting postdocs in 93 countries surveyed in June and July, 41% feel positive about their future careers, compared with an independent self-selected group we asked three years ago – when only 28% of the 7,670 respondents felt positive (see *Nature* 622, 419–422; 2023). That said, survey respondents in their thirties tend to be more negative about their experiences, including their salaries, and be more concerned about risks to academic freedom, than are those in their twenties (see page 881).

There are overlapping reasons for this change. In the past few years, funders and employers around the world have started to pay attention to the plight of postdocs. Rapidly rising living costs have left postdocs increasingly strapped for cash. In Canada and the United States, early-career researchers are getting organized and are taking industrial action to demand higher salaries (see *Nature* 621, 431–433; 2023).

Institutions have not sat on their hands. Since 2019, large employers – including Germany’s Max Planck institutes,

the Wellcome Sanger Institute near Cambridge, UK, and Stanford University in California – have been listening to their postdocs through surveys to better understand their needs and have been trying to find ways to improve pay and working conditions. In December, a US National Institutes of Health working group will publish recommendations that will affect how the agency funds and manages postdocs.

In the wake of MeToo, Black Lives Matter and other global antidiscrimination movements, many universities have introduced policies to boost diversity and promote inclusion. As in many other sectors, the COVID-19 pandemic has thrown a spotlight on the need to support the well-being of academic employees. More than half of postdocs told *Nature’s* survey that they have considered leaving their scientific field because of mental-health concerns. Some organizations, including the Francis Crick Institute in London, have introduced mental-health first-aid schemes to support staff members.

Still, much more needs to be done to understand and meet postdocs’ needs. Principal investigators have been reporting that they are struggling to fill postdoc vacancies for a while, and in *Nature’s* survey, 44% of the respondents were aware of struggles to recruit in their workplaces. When asked to select the likely reasons for this, 81% agreed with the option that ‘a lack of career stability is leading postdocs down other career paths’; 78% agreed that ‘graduate students are choosing more lucrative careers that bypass the postdoc route’. Only 1% thought that a lack of skilled postgraduate students was to blame.

Part of the reason for the historical disregard of postdocs is that academic employment has been a buyer’s market: there are many more postdocs who want to stay in academia than available permanent positions. Nearly two-thirds of the survey respondents intended to continue their career in academia, even though the path from PhD qualification to professor is neither straightforward nor something that can be planned. How many will succeed will vary depending on disciplines and countries (some sources suggest fewer than 5% of PhD graduates end up in permanent academic positions, although others say it could be as high as 30%). Regardless, this means that although many of the postdocs surveyed by *Nature* will probably not fulfil their academic ambitions, they continue to harbour hopes.

But this mismatch between ambition and reality should not prevent universities treating postdocs better. Nor should the fact that most researchers do not stay with the same institution for decades, as might once have been the case. Postdocs should still be valued as employees, and employers held accountable for their treatment.

The fact that postdocs in some parts of the world are taking strike action is an indication of just how bad things have become. Some institutions are responding, partly as a result. Others must follow, and realize that improving the postdoc experience is the right thing to do.

This essential workforce continues to be undervalued and overworked. Paying postdocs better and ensuring that their needs for stability and career support are met must be priorities wherever researchers are employed.

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